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CUTLERY MARKING OF CHINAWARE

The attention of the bureau has been directed a number of times to the so-called cutlery marking of tableware. When such objects as silver-plated knives are drawn across tableware a mark results which can not be removed by washing. This has caused complaints to manufacturers of the ware. The bureau has carried on certain work which would seem to indicate that the trouble is caused by a slight, almost inappreciable roughening of the surface of the ware because of its being fired in the presence of gases from sulphur in the kiln.

This was shown to be the case by taking some pieces of ware from a manufacturer which did not show any cutlery marking and giving them a firing in an electric muffle into which measured amounts of sulphur dioxide were introduced. When as little as 0.0625 per cent by volume of this gas was introduced into the muffle the ware on removal gave ready evidences of cutlery marking.

It was further found that on treating the ware fired as described above, with solutions of ammonium acetate, lead sulphate was dissolved from the surface of the glaze. On the removal of this material by such processes as buffing, the ware no longer would mark. Samples of enameled iron similarly fired also developed a condition which resulted in cutlery marking. Commercial practices would seem to confirm the above result. One manufacturer in substituting an electric muffle for firing his decorated ware obtained a product that was no longer susceptible to cutlery marking. The fact, however, that this trouble was due to the formation of an extremely thin layer of lead sulphate seems not to have been noted previously.

CHANGE IN VOLUME DURING USE OF BURNED CLAY BODIES

The Columbus branch of the bureau is conducting an investigation of the change in volume of burned clay bodies resulting from the autoclave treatment. In order to study the effect of composition of the body on the expansion caused by the autoclave treatment, several bodies with the following limits of composition were made and subjected to a three-hour treatment at 150 lbs./in^2 steam pressure.

	Per cent
Clay (total)	48 to 56
Flint	26 to 34
Feldspar	14 to 18

Expansions due to the autoclave treatment were taken on the bodies fired to cones 5–6, 8–9, and 11–12. It was found that practically a linear relationship existed between the percentage of expansion and the cone firing temperature. Results pointed that on replacing clay by feldspar and with the flint constant, there was an increase in expansion, although the change was little more than the experimental error involved in the measurements. Also on increasing clay at the expense of flint, with feldspar constant, a greater expansion was secured. The changes in expansion within the above body limits were small and seemed to show that little can be done in the way of decreasing the expansion by a variation of the feldspar-clay-flint content, providing the same raw materials are used and the bodies have the same ball clay-china clay ratio.

Bars made of typical English and American ball and china clays were fired to cones 5–6, 8–9, and 11–12 and their expansions determined after a three-hour autoclave treatment under a steam pressure of 150 lbs./in.^{2} The two English china clays used gave a much greater expansion than did any of the other clays, with the two American china clays giving a considerably lower change. It was found that the bodies made a feldspar, clay, and flint gave a greater expansion than the pure clays, which indicates that the changes are not due solely to the clay constituents of the body. The ball clays showed, with one exception, no expansion even at the cone 5–6 firing. One American ball clay showed an expansion of 0.014 per cent at cone 5–6, but this decreased to zero at cone 8–9. It was found that with the same clay or body an increase in absorption would be accompanied by an increase in expansion.

Samples of commercial bodies made in the form of bars were subjected to a three-hour autoclave treatment under a steam pressure of 150 lbs./in.^{2} and their changes in length noted. The absorptions of the bars after treatment were also determined. A buff wall tile body showed an expansion of 0.057 per cent with an absorption of 6.6 per cent; a cream wall tile expanded 0.016 per cent and had an absorption of 2.1 per cent. A terra cotta body expanded from 0.045 to 0.056 per cent with absorptions of 11.2 and 12.5 per cent, respectively. White semivitreous dinner ware expanded 0.071 per cent (absorption 9.6 per cent) and ivory semivitreous dinner ware expanded 0.065 per cent (absorption 7.8 per cent).

STANDARDIZATION OF FELDSPAR CLASSIFICATIONS

Feldspar, one of the important components of porcelain enamel, many kinds of glass, vitreous china, pottery, and, in fact, most products of the ceramic art, has long been a source of misunderstanding between buyer and seller because of its widely variable character and the absence of generally recognized quality designations.

Formerly the material was bought largely on the basis of geographical location of the deposits from which the material was ground, but this has been found to be an unreliable criterion since variations exist within the same deposits.

With the closer control of production in the ceramic industry the users of feldspar are seeking more specific information, so as to reduce the variables in the finished product arising from this source.

To meet this need the producers of feldspar, through their trade organization, the Feldspar Grinders' Institute, requested the division of trade standards of the Bureau of Standards to cooperate in the establishment of a standard classification that will become universally understood in the language of their industry.

A tentative commercial standard classification, based on fineness and chemical tests, was discussed at a general conference held at the bureau on January 14, 1929. The conference was attended by representatives of feldspar grinders, distributors, and users, and it seems certain that the standard as finally adopted will be mutually acceptable to all concerned.

Copies of the tentative standard may be obtained by addressing the Division of Trade Standards, Bureau of Standards, Washington, D. C.

HEAT INSULATING MATERIALS

Within the past few years there has been great activity in the field of thermal insulation, particularly for dwellings, and a large number of materials have been utilized in the manufacture of insulating products of various kinds. There are numerous other raw materials, now considered more or less waste, which may be equally suitable for this purpose.

Anticipating the need for additional data, the bureau is conducting a study of the insulating properties of various fibrous materials. Tests have been made on jute, cotton, flax, wood fiber, bagasse, corn stalk fibers, moss, excelsior, wood shavings, etc. From an insulation standpoint, alone, there is practically no choice between the different commercial grades of these materials. The waste or poorest grades, therefore, may be commercially available for the manufacture of heat insulating materials.

Tests are being made of each fiber, packed to different densities ranging as widely as practicable, and it is found that each fiber has an optimum density at which the thermal conductivity is a minimum or the insulatin value a maximum. This suggests that to derive the most insulating value from given amounts of material, it should be packed to its optimum density.

Tests have also been made on mixtures of different fibers, and it has been found that the addition of relatively small quantities of good insulating materials to large quantities of comparatively poor material may yield a product of surprisingly good insulation value.

EFFECT OF SMALL CHANGES IN TEMPERATURE ON THE PROPERTIES OF BODIES

Laboratory investigators who have used torsion wires for the accurate measurement of twisting forces, or diaphragms for the measurement of pres-

sure, must have been puzzled at times by the question of determining what proportion of the observed change in stiffness of the elastic system with variations in temperature is due to a change of elastic modulus, and what proportion is caused by ordinary thermal expansion. Increase in the diameter of a torsion wire due to thermal expansion stiffens the wire, but simultaneously there is a decrease in the rigidity or sheer modulus of the material of the wire, tending to offset the influence of thermal expansion more or less.

In physical and engineering investigations involving the properties of bodies (as distinguished from substances or materials) it is often necessary to determine at least approximately what will be the effect of small departures from the normal working temperature. This is usually done either (1) by a detailed computation or (2) by a direct experiment in which the temperature is actually varied.

A paper entitled "The Effect of Small Changes in Temperature on the Properties of Bodies," by M. D. Hersey, appears in the Bureau of Standards Journal of Research, Vol. 4, No. 1; January, 1930. (Research Paper No. 137) In this paper two new methods are given for determining the effect of small departures from normal temperature upon any property of a body, such as the stiffness of a spring or the accuracy of an instrument: (1) A simple calculation, applicable in some cases, based on the theory of dimensions; (2) a combined mathematical and experimental solution, which eliminates the necessity for actually varying the temperature of the body, provided the thermal properties of the component material are known.

Finally, it is pointed out that the same treatment can be extended to any other condition analogous to temperature, such as hydrostatic pressure.

The following illustrative examples are given: (1) Stiffness of a flat spring of uniform section; (2) torsional stiffness of a wire of circular cross section; (3) vibration frequency of a flat, circular diaphragm clamped at the edge; (4) period of a pendulum; (5) stiffness of a spring of irregular shape subject to pure bending or twisting; (6) electrical and thermal resistance; (7) venturi air-speed indicator; (8) spring stiffness for complex stresses; (9) vibration frequency of a loaded spring; (10) coefficient of friction of a lubricated journal bearing; (11) effect of pressure on electrical resistance.

MAIZOLITH

An entirely new type of material has recently been developed from cornstalks. This material is somewhat like hard rubber in appearance and properties.

It is believed that cornstalks may eventually find their way into the manufacture of insulating material, noiseless gears, and similar products.

Investigators who have tried to make paper pulp from cornstalks long ago recognized the difficulty of overcoming the extreme tendency to hydrate, which seems characteristic of this material. The invention of maizolith is an attempt to take advantage of this characteristic of cornstalks. It has been found rather easy by severe chemical and mechanical treatment to hydrate the cornstalk completely, so that the product is a jellylike mass with no vestige of fibrous structure. Maizolith is prepared by drying this jelly and then machining the finished piece into the desired shape.

This development is a part of the cooperative work with Iowa State College to find industrial uses for cornstalks. A complete description of the process of manufacture will shortly be published by the bureau.

MANUFACTURE OF CURRENCY PAPER

The results of further experimental study of manufacture of currency paper are given in the December, 1929, issue of the Bureau of Standards Journal of Research, under the title "Further Experimental Production of Currency Paper in the Bureau of Standards Paper Mill." This information was developed in the continuation of the investigation to improve the durability of United States currency paper previously reported in Technologic Paper No. 329 The wear-resistant quality of currency paper was very much increased as a result of the experimental tests described in the earlier publication, but additional study of the paper-manufacturing processes with a view to further prolonging the service life of the currency was subsequently requested.

The study included the use of caustic soda as compared with lime for cooking the rags, the effect of variation in the fiber composition of the paper, the effect of modifications in the beating process, determination of optimum surface-sizing conditions for best printing results, and printing tests on the finished experimental papers.

The data showed that either lime or caustic soda is satisfactory as the digesting agent in the cooking process. Fiber mixtures of 75 per cent linen and 25 per cent cotton gave the best paper for currency use, although paper made from equal proportions of these fibers was of very good quality. Gradual application

of roll pressure in the beating process was found to be essential to best results Formaldehyde proved better than alum as glue preservative in the surface-sizing bath.

Comparative tests of commercial manufacturing procedure and bureau practice were made at the request of manufacturers desiring to produce paper of the type developed in the investigation. The experimental procedure gave equally good results with commercial equipment, and paper of similar quality is now being made commercially.

Description of the manufacturing procedure, tables of experimental data, and discussion of the results are included in the publication. Separate copies of this publication, Research Paper No. 121, will be available later for purchase from the Superintendent of Documents, Government Printing Office, Washington, D. C.

RAPID TANNING PROCESS FOR SOLE LEATHER

In special Circular No. 1101, issued by the hide and leather division of the Bureau of Foreign and Domestic Commerce, a new rapid tanning process developed in Germany is described. The process, in general, consists of suspending hides in a closed vessel to which the tanning solutions are admitted and the system subjected alternately to vacuum and pressure. It is stated that the tanning of hides for use as sole leather can be accomplished in 8 to 10 days. Samples of sole leather said to be tanned by the process have been analyzed in the leather laboratory of the Bureau of Standards, and it is believed the results will be of interest to tanners in this country.

Composition of sole leathers

[Results below, except first item, expressed in per cent on moisture-free basis]

	New German process	Average American tannage
Moisture, in per cent	9.78	11.98
Water solubles	22.72	30.66
Hide substance	51.36	39.11
Grease (P. E. E.)	.33	3.57
Insoluble ash	.10	.17
Combined tannins	25.49	26.49
	100.00	100.00
Degree of tannage	49.70	67.80
Soluble tannins	17.85	----------
Soluble nontannins	4.87	----------
Glucose	Trace.	6.63
Epsom salts	.99	5.33
Acid (P. & S.)	.71	.77
Total ash	1.49	2.47

The leather produced by this process is characterized by low water solubles, grease, glucose, and salts contents and high hide substance in comparison with leather produced in this country.

FIRE RETARDANT SURFACE TREATMENT FOR WOOD SCAFFOLDING

Several serious fires in the scaffolding of buildings and bridges during construction have resulted in large property loss and delay in completion. Of those recently occurring in buildings can be mentioned those in the Sherry-Netherlands Apartment Hotel, Fifth Avenue Aeolian Building, and the Riverside Church, all in New York City.

The bureau has received frequent inquiries relative to methods that can be employed to decrease this fire hazard, and some tests were undertaken employing several types of treatments meeting the special conditions involved. Impregnation or coating with many of the chemicals generally used to produce a fire retardant condition are objectionable on account of irritating effects on hands of workmen, particularly in case of injury. Also, no coating can be applied to the surface of the timber so opaque that it obscures defects that have a bearing on strength.

Preliminary tests with various chemicals applied to the surface of the wood indicated that the penetration into the wood was insufficient to obtain any appreciable fire retardant effect. Of acceptable surface coatings, sodium silicate (water glass) appeared promising, and further ignition and spread of flame tests were conducted with this treatment.

The specimens for the ignition tests consisted of pieces of short-leaf or loblolly pine, Western pine, or Douglas fir, 10 inches square and ¾-inch thick, and for the spread of flame tests the specimens were 2 inches wide, 18 inches long, and ¾-inch thick. Except for a 3-inch length on one end of the long specimens, they were coated on all sides with one brush coat of sodium silicate of specific gravity 1.38, thinned with water to specific gravity 1.33.

The ignition tests were conducted by applying safety match flames, 1-inch yellow bunsen burner flames, and 8-inch blue bunsen burner flames for periods of one minute to the corner, edge, or flat side of the specimen. Burning continuing for one minute or more after removal of the igniting flame was considered as ignition. Ignitions using safety matches were obtained in 63 per cent of the trials with the untreated specimens and in 14 per cent of the trials with the treated specimens, the results being averaged for

the three species of wood. Specimens exposed to the weather for about three weeks and subjected in this time to three rains, were ignited in 39 per cent of the trials. With the 1-inch bunsen flame ignition was obtained in 78 per cent of the trials with the untreated specimens and in 3 per cent when coated with sodium silicate. The 8-inch bunsen flame gave 97 per cent ignition with untreated specimens and 12 per cent when treated.

In the spread of flame tests with the pieces held vertically the untreated 3-inch portion was ignited with a bunsen burner flame and the spread of flame on a 12-inch length of the treated portion noted. Taken as an average for the three species the flame spread over the 12-inch marked length of the untreated specimen was 8 inches, and only 0.7 inch for the treated pieces.

The effectiveness of the treatment was somewhat greater for the Western pine and Douglas fir than for the short-leaf or loblolly pine, possibly because of greater penetration. An additional coat would undoubtedly have increased the fire retardant effects considerably. The tests with the specimens exposed to the weather indicated loss of a considerable amount of the coating in three weeks' time, hence the treatment can be considered useful mainly for inside scaffolding.

Fine sand was applied on the coating of some of the specimens before it dried. The amount was not sufficient to affect appreciably the fire retardant effect of the treatment, but it increased the roughness of the surface to an extent that more than counteracted any slipperiness produced by the sodium silicate. For scaffolding, the sand can be applied for this purpose to the wearing surfaces.

It should be noted that the test conditions duplicate only those incident to the initial start and spread of the fire, and while a treatment that prevents ignition and retards the spread of fire from small sources is of value, it should not be understood as giving protection after the fire has attained any considerable volume. At the high temperatures incident to the latter condition surface coatings are readily destroyed or their effects otherwise nullified, and they can not retard appreciably the further spread of the fire.

TENSILE PROPERTIES OF RAIL AND OTHER STEELS AT ELEVATED TEMPERATURES

A paper on the tensile properties of rail and other steels at elevated temperatures will be presented by John R. Freeman, jr., at the annual meeting of the American Institute of Mining and Metallurgical Engineers, in New York during the week of February 17. In this paper, it is pointed out that the Bureau of Standards has been cooperating over a period of years with rail manufacturers and railroads in a joint study to determine the origin of rail failures, particularly the type known as transverse fissure. In some previous work the bureau made an extended study of the endurance properties of both new and used rails. The results of these studies led to conclusion that the nucleus of the transverse fissure was probably present in the new rail before placing in track and that the fissure developed in service from this nucleus. The origin of this nucleus is obscure. It was thought to be a minute crack or group of cracks of microscopic dimensions which formed in the rail while hot at some time during its manufacture. A study has, therefore, been made of the strength and ductility of rail steels at elevated temperatures. It has been found that in the temperature range 500° to 700° C. the ductility of some rail steels and some other steels is relatively very low. This range of temperature has been termed the secondary brittle range and the phenomenon secondary brittleness. These terms have been given to distinguish the phenomenon from the well-known phenomena of blue brittleness and hot-shortness in steel.

A study was also made to determine the temperature distribution in a rail during cooling under different conditions.

As a result of these studies it has been shown that under certain conditions of cooling, because of the large temperature gradients present, the stresses developed in a rail or other steel structure while cooling through the secondary brittle range may be sufficient to cause internal ruptures which may act as nuclei for fatigue failure (transverse fissures) in service.

DIRECTIVE RADIOBEACON SYSTEM

The study of possible transmitting circuit arrangements for affording the simultaneous transmission of radiobeacon and radiotelephone signals was continued. In preliminary experiments one method was used in connection with the 12-course beacon transmitter which gave good phone and beacon signals at short distances from the transmitting station. Refinements in the transmitting circuit arrangement were begun preparatory to test flights over distances more nearly those required in practice. This method applies equally well to the 4-course beacon.

A number of test flights were made using the 4-course type radiobeacon for the purpose of determining the increased

sharpness of the beacon courses resulting from the elimination of coupling between the two loop antennas. As previously reported, this is effected by means of a simple mutual coupling arrangement inserted in the antenna circuits. A deviation of ±1° from the true course may now be detected as compared with ±2°, the best previous value.

FOG LANDING

A directional marker beacon was installed at Mitchel Field, Long Island, for the Guggenheim Fund, for use in connection with fog landing experiments. This marker beacon is employed in conjunction with the directive localizing beacon and serves to define a line perpendicular to the localizing beacon course. At Mitchel Field it is used for marking out one edge of the landing field.

SHOULD SIEVES COARSER THAN THE NO. 200 BE CALIBRATED?

The appreciable differences in the performance of some sieves of the same nominal mesh, and coarser than the No. 200 sieve, have been brought to attention several times recently both through actual tests and in discussion between interested laboratories. It seems that consideration should be given to the feasibility and desirability of providing some means of calibrating these sieves. Sieves at least as coarse as the No. 20, while complying with the specifications for dimensions of openings, have been found to differ in results of sieving by very appreciable amounts. For example, careful hand tests on well prepared samples of sand, using similar methods for each sieve, gave the following as the indications of three No. 20 sieves, all of which sieves had been found in compliance with specifications.

Sieve	Percentage retained
A	6.3
B	3.4
C	2.0

These sieves have been used in other tests, with somewhat similar indications of relative performance. Three No. 30 sieves, when used in careful tests of another sample of sand, gave following indications:

Sieve	Percentage retained
D	3.8
E	7.3
F	7.7

A brief study of some other tests indicates that these differences in performance must be characteristic of some of the sieves used in the study of sands and other materials of similar type. There is the possibility that some work may not justify extreme refinement and that the labor of calibration might not be warranted by the benefits resulting therefrom. However, there are some cases where it is desired to obtain more nearly correct values, particularly when making comparisons between various laboratories. This has been found true in foundry research. The abrasive industry, using sieves quite close together in the series of size openings, desires accurate indications of size and gradation of particles.

It has been understood that it is not feasible to make the tolerances for sieve mesh more stringent and, therefore, it would seem that one of the points meriting attention would be the practicability of providing standard samples, in somewhat the same manner as supplied for the calibration of the No. 200 sieve when used in testing cement. Such a question would require careful study of possibilities in the preparation of samples, the selection of standards with which to commence the work, the needs of interested industries and laboratories, and particularly whether the samples should be graded over a considerable range in sizes or be restricted to certain narrow zones of sizes, each of which zones might be applicable to certain sieves of materials.

Whatever the solution of the question, and the need of the refinement, it is evident that the careful testing of sieves for compliance with specifications for dimensions of wire and opening may result in a false idea of accuracy of the indications of such sieves so long as there is lacking a means of correcting them with respect to some definite standard of performance.

STANDARDIZATION OF GAGES

A member of the gage section of the bureau attended the Chicago meeting of the American Petroleum Institute. At the meetings of the various standardization committees the general subject of gages and gaging practice was given considerable attention. At the meeting of the cable drilling tool joint committee the interchangeability of product passing the A. P. I. gages owned by the various manufacturers was the main subject discussed. Samples of the product of several manufacturers were exhibited and the interchange stand-off of the samples was determined. In general, this interchange was considered satisfactory, although several discrepancies

were noted which were difficult to account for. The samples of product have been shipped to the bureau for determination of lead errors. At the meeting of the pumping-equipment committee samples of pin and star gages suitable for use as "no go" gages for working barrels were exhibited. The present solid cylindrical "no go" plug is not considered adequate. It was not believed advisable to require the use of a star or pin gage at the present time, but it was recommended that the manufacturers inspect barrels with one of the pin or star gage types exhibited, or a similar gage, during the coming year with the idea of adopting one type as standard next year.

The correlating committee on gages and gaging practice voted to no longer require the interchange of sucker rod "go" or "no go" gages with the grand masters deposited at the bureau. With certain changes in the specifications it was felt that the complete measurement of the dimensions of the gages, as is done at the bureau, was sufficient control of these straight-threaded gages.

The question of the use of a mineral-oil lubricant in assembling cable and rotary tool joint gages was discussed, and it was decided that no change in the present practice of using medicinal mineral oil was desirable.

A member of the gage section also attended a meeting of the Diamond Core Drilling Manufacturers' Association at which the proposals of several gage manufacturers were discussed. It was found that the proposals differed somewhat with respect to the types and quality of gages to be furnished. Steps were taken to obtain bids on the types of gages recommended by the American Gage Design Committee.

INTERCHANGEABLE GROUND GLASS JOINTS FOR LABORATORY GLASSWARE

On December 17 a general conference of representative manufacturers and users of laboratory glassware met at the bureau and adopted a commercial standard for interchangeable ground glass joints. This standard, if accepted by the industry, should become the basis for everyday trade in interchangeable joints, which will be marked "S. T.," indicating standard taper and also with the manufacturers' and distributors' trademark, and the size.

These interchangeable joints will facilitate the setting up of laboratory apparatus and will provide for quick substitution of broken parts and effect considerable economies over the older method of having to replace the entire apparatus.

FRICTION AND LUBRICATION PUBLICATIONS

Letter Circular LC271, entitled "Publications Relating to Friction and Lubrication," has recently been issued by the bureau to meet the increasing demand for information regarding the published results of research on these subjects.

Following a chronological list of 141 titles extending from 1910 to 1929, inclusive, there is given an author index and a subject index. Among the principal topics which will be found in the subject index are the following: Automotive lubrication, ball and roller bearings, bibliographies (10 references are cited under this head), consistometers, cutting fluids, dimensional analysis of lubrication, effect of pressure on viscosity, effect of temperature on viscosity, gear testing, journal bearings, low temperature tests, oiliness, oxidation of oils, plasticity, rolling friction, standardization of viscometers, wear, etc.

Among the other bibliographies cited in this list are several which were prepared by committees of the American Society of Mechanical Engineers in cooperation with the Bureau of Standards, so that by following up the references provided in LC271 access can be obtained to a very large number of original sources of information.

NEW AND REVISED PUBLICATIONS ISSUED DURING DECEMBER, 1929

Journal of Research [1]

Bureau of Standards Journal of Research, Vol. 3, No. 6, December, 1929 (RP Nos. 120 to 128, inclusive). Obtainable only by subscription.

Research Papers [1]

(Reprints from Journal of Research)

RP108. Compressive strength of clay brick walls. A. H. Stang, D. E. Parsons, and J. W. McBurney. Price, 30 cents.

RP111. The heat of formation of sulphur dioxide. J. R Ekman and F. D. Rossini. Price, 10 cents.

RP112. Optical heterogeneity of a fused quartz disk. L. W. Tilton and A. Q. Tool. Price, 5 cents.

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[1] Send orders for publications under this heading with remittance only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 25 cents per year (United States, Canada, Cuba, Mexico, Newfoundland, and Republic of Panama); other countries, 40 cents. Subscription to Journal of Research, $2.75; other countries, $3.50. Subscription to Commercial Standards Monthly, $1; other countries, $1.25.

RP113. Data on ultra-violet solar radiation and the solarization of window materials. W. W. Coblentz and R. Stair. Price, 15 cents

RP114. Progress report on investigation of fire-clay bricks and the clays used in their preparation. R. A. Heindl and W. L. Pendergast. Price, 15 cents.

RP115. The first spectrum of xenon. W. F. Meggers, T. L. deBruin, and C. J. Humphreys. Price, 15 cents.

RP116. The arc spectrum of arsenic. W. F. Meggers and T. L. deBruin. Price, 10 cents.

RP117. Metallographic polishing. I. Automatic metallographic polishing machine. S. Epstein and J. P. Buckley. Price, 10 cents.

RP118. Correcting engine tests for humidity. D. B. Brooks. Price, 10 cents.

RP119. Analysis of diaphragm system for the X-ray standard ionization chamber. L. S. Taylor. Price, 10 cents.

Simplified Practice Recommendations [1]

SPR101–29. Metal partitions for toilets and showers. Price, 10 cents.

Commercial Standards [1]

CS12–29. Domestic and industrial fuel oils. Price, 5 cents.

Miscellaneous Publications [1]

M97. Thermal properties of petroleum products. Price, 15 cents.

Commercial Standards Monthly [1]

CSM. Vol. 6, No. 6, December, 1929. Obtainable only by subscription.

Technical News Bulletin [1]

TNB153. Technical News Bulletin, January, 1930. Obtainable only by subscription.

OUTSIDE PUBLICATIONS [2]

In this list are included, in so far as possible, all articles by members of the bureau's staff on scientific and technical subjects. Some of these articles are written in the author's unofficial capacity only, and deal with subjects outside the field of the Bureau of Standards. The article itself should always be consulted to determine whether or not it expresses the official opinion of the bureau.

Applying the double-modulation type radio range to the airways. H. Diamond; Proceedings, Institute of Radio Engineers (New York, N. Y.), Vol. 17, p. 2158; December, 1929.

Applying the radio range to the airways. F. G. Kear and W. E Jackson; Proceedings, Institute of Radio Engineers (New York, N. Y.), Vol. 17, 2268; December, 1929.

The development of the National Electrical Code. M. G. Lloyd; Laboratories' Data (National Board of Fire Underwriters, Chicago, Ill.), Vol X, No. 11, p. 239; November, 1929.

Precision machines and instruments for the measurement of length. George K. Burgess; Paper No. 335 presented at the World Engineering Congress (Tokyo, Japan); November, 1929.

Instruments for measuring ultra-violet radiation and the unit of dosage in ultra-violet therapy. W. W. Coblentz; Medical Journel and Record (New York, N Y.), Vol. CXXX, No. 12, p. 691; December 18, 1929.

Durability of rubber products improved by Federal research. P. L. Wormeley; United States Daily (Washington, D. C.), Vol. IV, No. 250, p. 8; December 24, 1929.

Qualities of rubber are studied to increase utility of products. P. L. Wormeley; United States Daily (Washington, D. C.), Vol. IV, No. 251, p. 8; December 26, 1929.

Rayon investigations at the Bureau of Standards. W. D. Appel; Textile World (New York, N. Y.), Vol. LXXVI, p. 4372; December 14, 1929.

Quality of leathers improved by studies of tanning methods. R. C. Bowker; United States Daily (Washington, D. C.), Vol. IV, No. 247, p. 8; December 20, 1929.

Comparative tests of chinaware using two forms of testing machines. G. W. Wray and C. M. Brand; Journal, American Ceramic Society (Columbus, Ohio), Vol. 12, No. 11, p. 716; November, 1929.

Observations of Uranus. Hugh G. Boutell; Popular Astronomy (Northfield, Minn.), Vol. XXXVII, No. 10, p. 606; December, 1929.

Research and testing—Valuable services to American industry. George K. Burgess; The Scovill Standard (Waterbury, Conn.), Vol. 1, No. 6, p. 1; December, 1929.

[1] Send orders for publications under this heading with remittance only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 25 cents per year (United States, Canada, Cuba, Mexico, Newfoundland, and Republic of Panama); other countries, 40 cents. Subscription to Journal of Research, $2.75; other countries, $3.50. Subscription to Commerical Standards Monthly, $1; other countries, $1.25.

[2] "Outside publications" are not for distribution or sale by the Government. Requests should be sent direct to publishers.

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